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The careers of 799 male and 1,265 female teachers employed in Oregon school districts were traced for 4 years from 1962 to 1966 to determine the teachers' survival rates. The primary method of analysis chosen was an actuarial approach which involves construction of a survival curve showing numbers of teachers surviving after each period of time and the rapidity with which the initial group of teachers leave their districts. Results show that nearly seven out of 10 teachers hired by Oregon school districts will no longer be serving as classroom teachers in the same districts 5 years later. The shortest survival expectancies were found among females between the ages of 20 and 24, next shortest amount females between 25 and 29, and males between 20 and 24 were the third poorest risks. Over 40 percent of all newly appointed teachers were in these groups. On the other hand, ladies in the 40 to 54 age group had the best survival records, but barely 10 percent of newly employed teachers fell into this category. Administrators seem to employ just those teachers that have the poorest experience of surviving. Differences in survival rates for male teachers were observed among districts, with more populated districts having the best records and the remote, less populated ones the poorest. (TT)

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TEACHER SURVIVAL IN OREGON SCHOOL DISTRICTS: FIRST RESULTS OF A STATE-WIDE STUDY

by

W. W. Charters, Jr.

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FIRST RESULTS OF A STATE-WIDE STUDY

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Author: Teacher Perceptions of Administrator Behavior, Final Report, U. S. Office of Education Cooperative Research Project #929, 1964.

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TEACHER SURVIVAL IN OREGON SCHOOL DISTRICTS:
FIRST RESULTS OF A STATE-WIDE STUDY

Nearly seven out of ten teachers hired by Oregon school districts this fall will no longer be serving as classroom teachers in the same districts five years hence.

This estimate is based on findings of a study nearing completion in the Center for the Advanced Study of Educational Administration at the University of Oregon,[1] using data from two thousand teachers employed in the fall of 1962 whose careers were followed through four succeeding years.

It is clear from the study that Oregon administrators employ exactly those teachers who have the poorest experience of surviving in the districts. By far the shortest "life expectancies" are found among young females between the ages of 20 and 24, the next shortest among females between 25 and 29. Yet new appointments are heavily concentrated in these people. Young males in the 20 to 24 group also are poor survival risks. Over forty per cent of all newly appointed teachers in the state are in these three groups. On the other hand, ladies in the 40 to 44 and the 50 to 54 age groups had the best survival experience of all, but barely ten per cent of the newly employed teachers fell in these categories.

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[1]CASEA is a national research and development center which was established at the University of Oregon under the provisions of the Cooperative Research Program of the United States Office of Education.

The Actuarial Approach

One of the principal purposes of the study was to apply, on a large scale, the actuarial approach to the problem of teacher turnover pioneered a few years ago in Missouri by Dr. Joy E. Whitener.[2] Whitener had developed the techniques in a pilot study involving several hundred new teachers in ten school districts in the suburban St. Louis area. Whether or not his findings would hold for another time and place was one of the questions that confronted the CASEA investigators, and they were also interested in exploring some questions regarding the causes of teacher turnover that Whitener's small sample did not allow him to answer himself.

The key to the actuarial method is the survival curve. The curve is constructed by choosing a number of teachers who entered their school districts at approximately the same time and tallying the number remaining as classroom teachers in their respective districts after one year of service, two years, and so on. Converted to percentages, the numbers surviving after each period of time are plotted on a graph, and a line is drawn to connect the points. This line forms the survival curve. Its slope displays the rapidity with which the initial group of teachers leave their districts or, looked at another way, their rate of survival in the district. An example of the survival curve is shown later in Figure 1.

Whitener extended his curves through ten years, but the Oregon study carried them through only five. This limitation was imposed partly because of the investigator's interest in using information about as recent a group of teachers as possible. More importantly, though, it was due to Whitener's finding that most

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[2]See Whitener, An Actuarial Approach to Teacher Turnover (Unpublished Ed. D. dissertation, Washington University, St. Louis, Mo., 1965).

teachers who depart from their school districts do so within the first five years; thereafter, the proportions leaving are relatively small. The early part of the curve seemed to be the most interesting.

The customary approach to the study of teacher turnover involves the use of annual turnover ratios, often calculated as the proportion of teacher separations during the year to the total number of teachers in the district. These annual ratios lend themselves well to the examination of trends over blocks of years and to the comparison of school districts, teaching levels, and geographic regions. One of the findings that has emerged most persistently from comparisons of turnover ratios is their regular and strong relationship with school district size. The larger the district, the lower the turnover ratio.

The survival curve deals with the same problem but from a different perspecti It focuses on the history of a given group of teachers over a number of years and reveals something about the experience school districts have had (and can expect to have) with its members. Curves can be constructed for sub-classes of districts and for sub-groups of teachers to determine if the slopes differ according to either district characteristics or teacher attributes. In this way, the survival curve approach is more useful than the turnover ratio in trying to unravel the causal factors behind teacher separations.

Methods of the Study

Four kinds of information were used in the study, some of which was furnished through the courtesy of Dr. Milton R. Baum of the Oregon State Department of Education, and some of which was laboriously compiled by Mr. Frank Walch, a graduate research assistant in CASEA and now an elementary principal in Springfield.

First a roster of all teachers new to their school districts in the fall of 1962 was furnished by the State Department. It covered all Oregon public school districts (with the exception of Portland) that had made any new appointments that fall. Administrators, non-teaching personnel, and persons in intermediate district: were culled from the list, leaving a cohort of 2,064 classroom teachers. The new appointees were not necessarily new, inexperienced teachers, although nearly forty per cent of them in fact were.

Second, it was necessary to have data regarding the personal attributes of each teacher--such things as age, sex, teaching assignment, and the like. These data were included on the roster furnished by the State Department. Age and teaching assignment were recorded as of the time of first appointment. Unfortunate certain teacher attributes that theoretically should affect survival were not a matter of record in the State Department and could not be used in the present study. In particular, these were the teacher's marital status, the number and ages of dependent children, and information on family earnings.

Third, information regarding school district characteristics was gleaned from published reports of the State Department of Education either for the 1962-63 school year or for an adjacent year. These tabulations dealt with such characteristics as district size, wealth, type (elementary, high school, union), and geographical location. Teachers in districts that consolidated between 1962 and 1966 were regarded as having continued in the same district so long as they remained in the newly formed unit, but in a few cases it was impossible to determine to which of several units teachers should properly be assigned and they were dropped from the study.

The final and crucial piece of information had to do with the length of time teachers remained in their respective school districts as classroom teachers. To obtain these data, the name of each teacher in the cohort was traced through

county and school district directories for four succeeding years after the fall of 1962, ending with the fall of 1966. When a teacher's name did not appear in an annual directory or when the directory indicated that he had assumed a non-teaching position, he was classified as not having survived into that year. Specia problems were encountered among female teachers whose names might have changed through marriage in the intervening year, and Mr. Walch made numerous telephone calls to school districts across the state to check on this possibility. No distinctions were made in this study between voluntary and involuntary separations, teachers on temporary leave and those who left permanently, or departures due to illness or death. From the administrator's standpoint, all of these are occasions for finding and hiring replacements, and to exclude such teachers (even were reliable information available) would underplay the magnitude of the turnover problem.

Error is inherent in the kinds of records used in the study. Mistakes are made in filling out forms for the State Department, in transferring information to IBM cards, in the publication of local directories, and at other points along the line. Many of them would not bias the results of the study in one direction or another, but directory errors would almost certainly lead to an under-estimate of length of teacher survival in the state. Errors of commission (publishing a teacher's name in the directory when he had left) are harder to make than errors of omission (failure to publish a teacher's name when he was still in the district). Hence, continued survival probably is under-recorded. Another feature of the study, however, could have produced a slight over-estimate. Systematically excluded by the methods of the study were teachers who received their appointments at times other than the beginning of the school year in 1962. Now if it is true that teacher taking a job in the middle of the school year are poorer survival risks than those appointed at the regular time (and it may be true), then their exclusion would

make the estimates of length of survival too high. There are relatively few mid-year appointments, though, so the effect on the accuracy of estimates would not be appreciable.

Selected Findings

Only a few of the study's findings, the ones most relevant to the Oregon scene, will be reported here. Others must wait until detailed analyses are completed. It can be said in general that the study results correspond closely to those obtained by Whitener in his Missouri investigation. The teachers he used as a cohort were new appointments to ten school districts between the years 1950 and 1954; the teacher cohort in the Oregon study consisted of new employees in the fall of 1962, a full decade later. The similarity in results of the two studies, conducted ten years and half-a-continent apart, lend considerable confidence to their generality.

The Shape of the Survival Curve

Survival curves for 799 male and 1265 female teachers in Oregon are shown in Figure 1. At the outset it should be noted that the curves for males and females are so characteristically different (a fact observed by Whitener) that all computations in the study were carried out for them separately. In any event, the plot for males in Figure 1 can be read in the following way: of 799 teachers newly employed in the fall of 1962 (100%), 79 per cent survived into the fall of 1963, 61 per cent survived into the third year, 48 per cent into the fourth year, and 40 per cent into the fifth year, or the fall of 1966. The curve for females is considerably steeper. Only 28 per cent of the 1265 were still teaching in the same district in the fall of the fifth year.

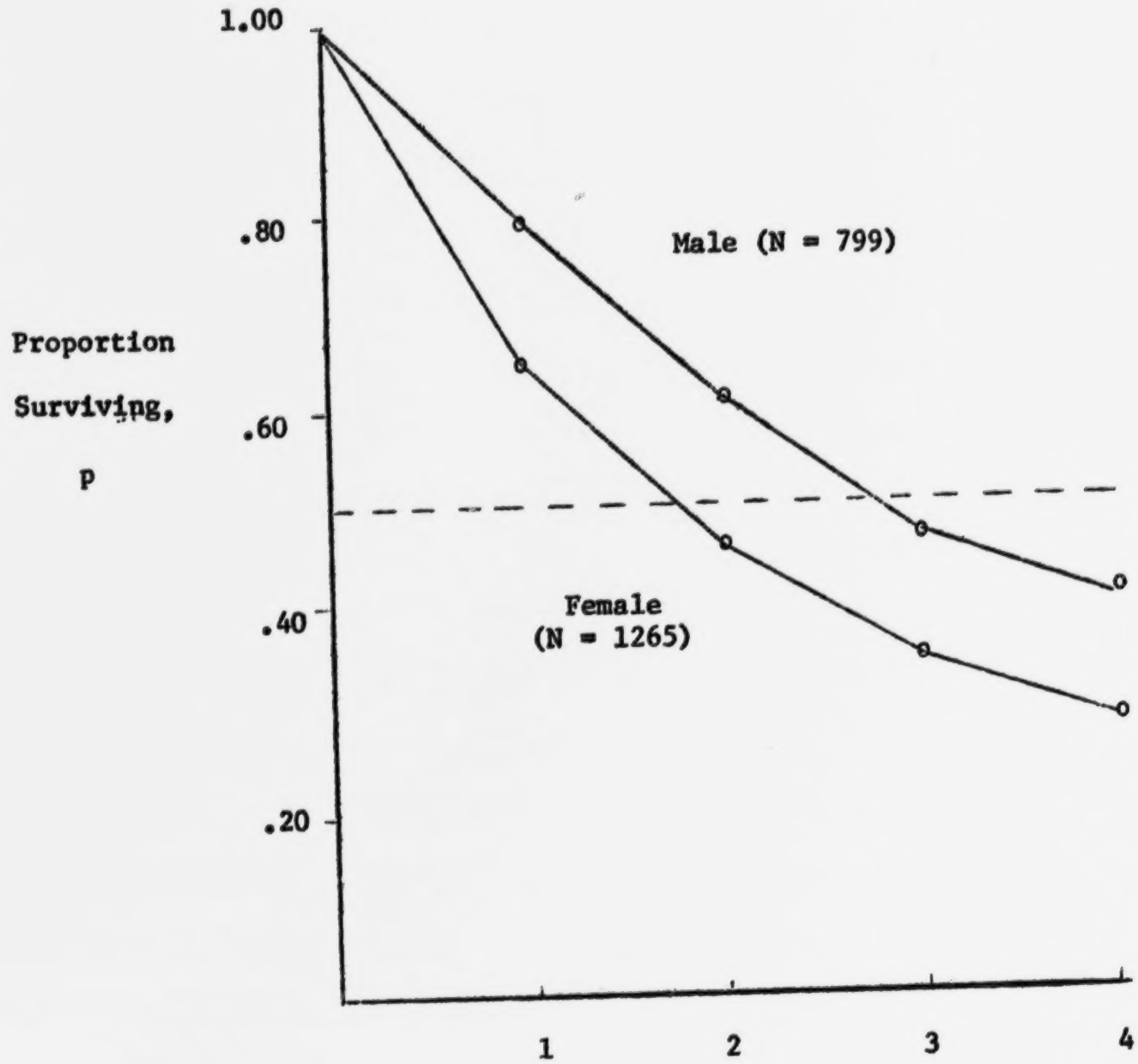

Fig. 1. Survival Curves for Male and Female Oregon Teachers.

Both curves have a very regular form, falling steeply at first and then gradually flattening out in later years. Obviously, the greatest numerical loss of teachers occurred in the first year and progressively diminished in succeeding years. Whitener's study showed that the flattening continued over the full ten years he covered, and there is no reason to believe that the same thing would not be true in the Oregon data had they covered an equally long period of time. The shape of the curves can be approximated by the negatively accelerated exponential function,[3]

$$\ln p = -xt$$

where $\ln p$ refers to the natural log of the proportion surviving in a given year, where t is the time interval (or year) in question, and where x is an empirically determined value representing the slope of the curve. Using a standard curve-fitting procedure the value of x for males was calculated to be -.235 and for females -.343. How well these smooth curves approximate the observed proportions is shown in Figure 2, where the same data as in Figure 1 are plotted on semi-log coordinates. The fit for males is very close. For females the simple exponential curve fits less well and might better be approximated by a more complex function, but it is close enough for present purposes.

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[3]Choice of the exponential curve was not arbitrary. It expresses what one would find with respect to survival if he accepted one extremely simple assumption about the causes of turnover. The assumption is that a large variety of forces act on teachers, some to induce them to leave the district and some to induce them to stay, and that the balance of these forces gives rise to a characteristic probability of surviving into the next year. According to the assumption, the probability (or "transition rate") remains constant from one year to the next for a given cohort of teachers. For example, the calculated probability of male teachers in Oregon surviving into the next year was .79; on this basis, 79 of 100 males would survive into the second year, 62 into the third year (.79 X 79), 49 into the third (.79 X 62), and so on. One task for research, then, is to see how well the simple assumption fits the facts and to determine what further assumptions must be added to account for nonconforming data.

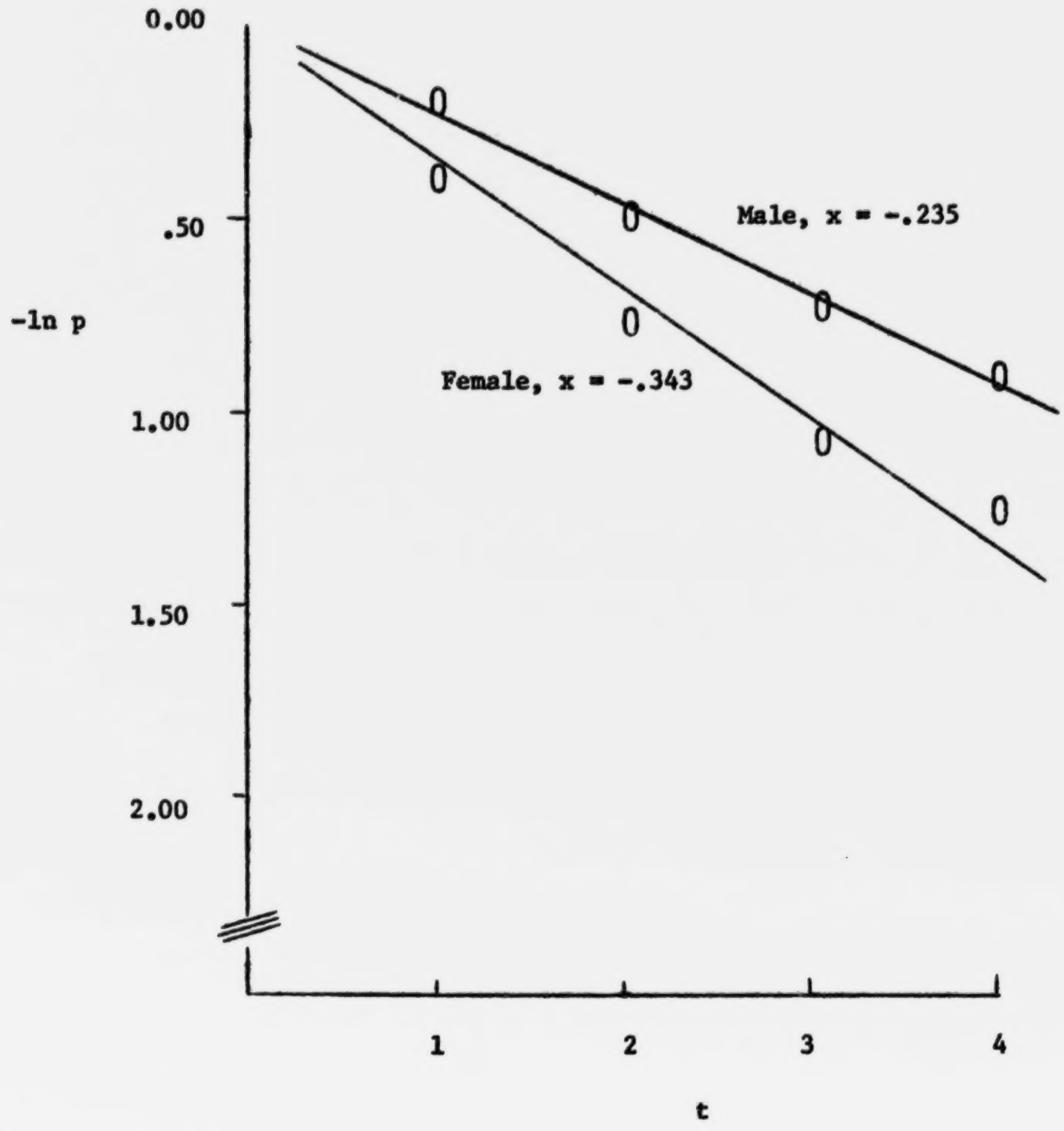

Fig. 2. Survival Data and Fitted Curve for Male and Female Oregon Teachers (semi-log coordinates).

The only point in going into these "higher mathematics" is that the slope of the curve is a handy way of describing the survival data. Median years of survival might have been used just as well. The larger the value of x, the steeper the slope of the curve and the smaller the proportion of teachers remaining after a given number of years. A slope of -.60 would be a very steep one indeed, while a slope of -.10 would represent a quite shallow curve. Median years of survival associated with a slope of -.60 is just over one year. That associated with the shallow slope of -.10 is nearly seven years. Incidentally, most of the slopes found in the data analyses so far range somewhere between these extremes.

Differences among Teachers

Two attributes of teachers--their sex and age at the time of employment--are powerful predictors of survival in school districts. Several other teacher attributes, however, turned out to be only weakly or irregularly related to survival, particularly after the effects of age and sex had been controlled. A word about the latter first.

Unrelated attributes. The level at which the teacher is employed--elementary or secondary--is not in itself a strong factor in survival. There is an indication that females survive longer in the elementary school and males longer in the secondary school, but the differences are trivial in comparison with those associated with age. This confirms Whitener's finding for Missouri teachers. Should it happen that an elementary school relied heavily on young females for its new teachers and a secondary school on older males or females, as some seem to do, the over-all differences in survival between the two schools would be large, but it would be less a result of teaching level than of the sex-age selection.

The amount of previous teaching experience, likewise, has little effect on survival, once age is controlled. The risks in employing a teacher of a given age who has never taught before are about the same as for another teacher of the same age who has a number of years of service to his credit. This, too, is consistent with Whitener's conclusions. Another attribute that Whitener found to be unrelated to survival, marital status at the time of employment, could not be checked in the Oregon study. In Missouri, at least, married females were as good survival prospects as single females, age constant.

Age and sex. In keeping with Whitener's findings, males as a group are better survival risks than females, older teachers better, as a rule, than younger ones. These gross findings, however, must be tempered by the fact that when age and sex are considered jointly the influence of age on survival operates differently in males and females.[4] The data in Table 1 for females indicate that survival improves sharply with increasing age (i.e., the slopes of the curves decline) up to about 55 years. The improvement is not entirely regular from one age group to the next, but one would not question the strong trend. For males, on the other hand, survival rates are virtually identical in four of the five age groups. (There were too few newly appointed male teachers over 45 years old to permit detailed age breakdowns.) Only the group of men under 25 has a clearly poorer survival rate than the others, and even this difference is not a large one. It would not be far wrong to say that age has a significant effect on survival among females but not among males. Although females are far poorer survival risks than males in the younger age groups, by the time they reach 40 the females are equally good if not better than males.

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[4]Whitener did not inspect the differential effects of age for males and females.

Table 1. Survival Rates for Male and Female Oregon Teachers by Age Group

Age Group	Slope of Survival Curve* Male	(No.)	Female	(No.)
Less than 25	-.316	(172)	-.525	(470)
25 - 29	-.223	(264)	-.424	(221)
30 - 34	-.202	(144)	-.251	(139)
35 - 39	-.211	(106)	-.289	(80)
40 - 44	-.228	(47)	-.172	(99)
45 - 49	**	(32)	-.226	(78)
50 - 54	**	(19)	-.134	(79)
55 - 59	**	(9)	-.255	(71)
60 and over	**	(6)	**	(27)

*The greater the absolute value of the number, the steeper the slope. The number is the coefficient in the equation $p = e^{-x}$, where p is the proportion of the cohort surviving.

**Number of cases too small to compute slope.

Thus, the survival rate of female teachers is extremely sensitive to the factor of age. This finding is consistent with other studies of the teaching career, which demonstrate that the occupational behavior of females, in contrast to males, is affected principally by forces lying outside the world of work. The female's sex role generally takes precedence over her occupational role, and her choices about work tend to be governed by marital and household considerations. These considerations, in turn, are closely linked with her age--her location in the life cycle. In her 20's or possibly early 30's marriage and child bearing loom large as contingencies in the young woman's work plans. In her 40's she may be sufficiently free from the demands of child care to resume a career, still contingent, however, on her husband's plans. But geographical mobility of families is not great by the time husbands reach their 40's and 50's and wives who do return to work can look forward to a relatively uninterrupted career. The studies suggest that the occupational behavior of males, on the other hand, is governed primarily by economic, vocational, and other work-related considerations. Such considerations, although related to age, are not so tightly locked into the life cycle as is true in the case of the female.

To provide grounds for the statements made in the opening paragraphs of this report, Figure 3 has been prepared comparing teacher recruitment and survival in various age groups. The bars on the left of the figure show the percentage of all 1962 teacher appointees by age (the percentage based on combined male and female). Bars on the right show median years of survival in the respective age and sex groupings. Median years of survival was obtained by a simple conversion of the data in Table 1.

The figure makes evident that recruits to teaching vacancies tend to be drawn from the age categories where survival prospects are poorest--from among those with the shortest "life expectancies." The youngest group of females is a

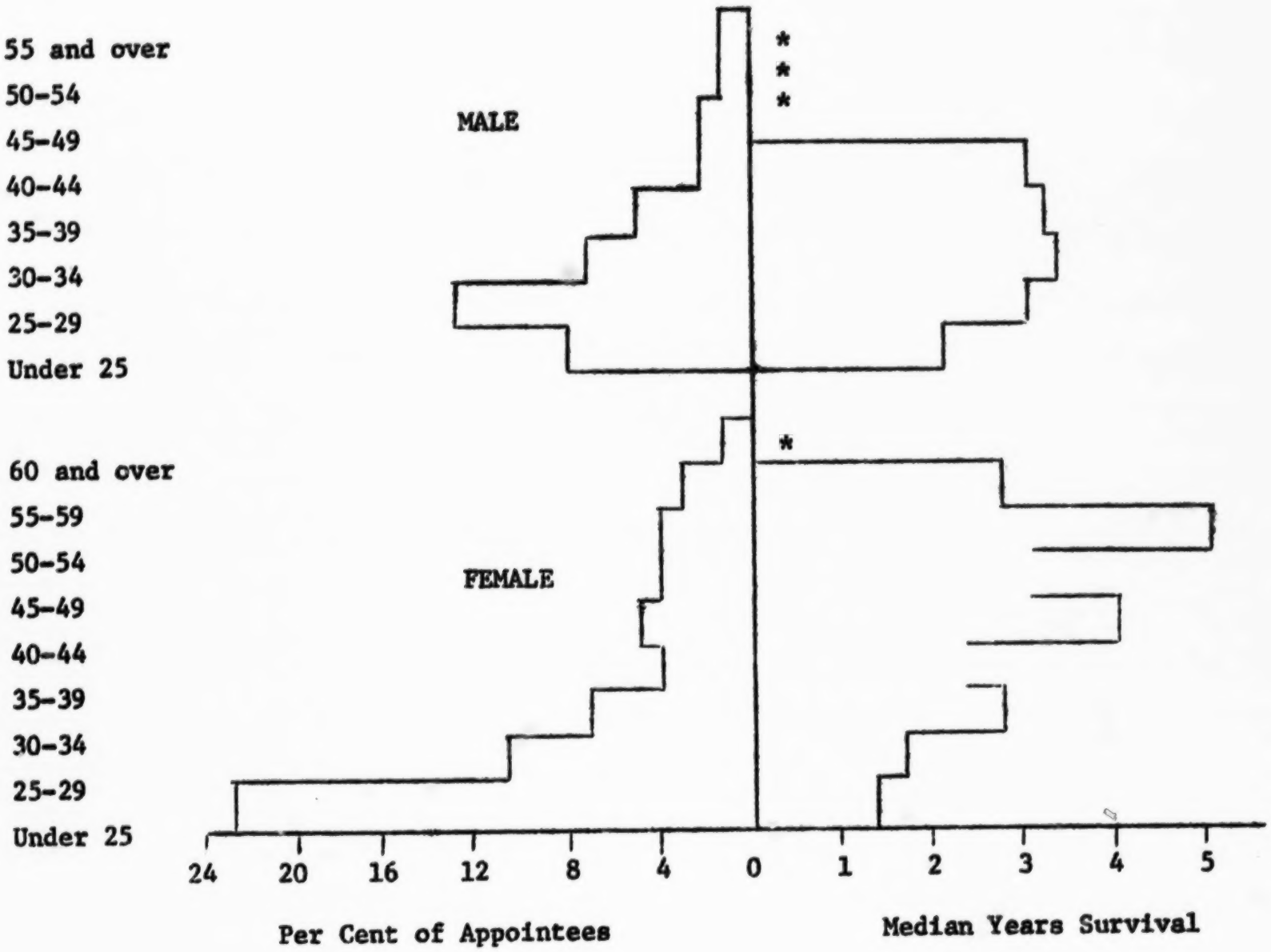

Fig. 3. Age Distribution and Median Years Survival by Age, Male and Female Oregon Teachers.

case in point: they constitute almost one quarter of all the new appointees in Oregon (at least they did in the fall of 1962), yet they can be expected to remain with their districts hardly more than a year, shorter than any other group. The next largest category, however, is comprised of males between 25 and 29, and their survival expectancies are favorable. But the general impression to be gained from Figure 3 is that the longer survival expectancies occur among those teachers who a least frequently appointed to the teaching vacancies.

School District Differences

Survival varies substantially from one region of the state to another, as Table 2 shows. To test for regional differences, curves were compiled for counties or groups of counties in Oregon. School districts in four counties--Multnomah, Washington, Marion, and Lane--had enough new teachers to permit constructing separate curves for the counties. The remaining counties were grouped in the seven regions specified in the table.

The best survival records are in the more populated counties of the Willamette Valley, while the poorest rates are in the counties of the extreme northeastern sector. If only males are examined, the shortest rates are all in the outlying corners of Oregon--Northeast, Southwest, Southeast, and Northwest. Survival rates for females do not follow this order quite so closely. Lane County stands out in this tabulation. Possibly because of the number of teachers who are wives of University students and faculty, Lane County districts lose females considerably more rapidly than other Valley districts.

Remoteness. The regional tabulations in Table 1 suggest that the geographical isolation, or "remoteness," of a school district may be a factor in teacher survive Correspondingly, districts were re-classified according to a rough index based on access to the major population centers of the state. The index was constructed as follows:

Table 2. Survival Rates for Male and Female Oregon Teachers by Region of the State

Regions and Counties	Slope of Survival Curve	
	Male	Female
Multnomah	-.139	-.327
Washington	-.149	-.291
Marion	-.254	-.321
Lane	-.230	-.409
North Valley (Yamhill, Clackamas)	-.232	-.272
Central Valley (Linn, Benton, Polk)	-.207	-.329
Columbia-Deschutes Basin (Hood River, Wasco Sherman, Gilliam, Morrow, Jefferson, Deschutes)	-.176	-.356
Northwest (Clatsop, Columbia, Tillamook, Lincoln)	-.264	-.492
Southwest (Douglas, Josephine, Jackson Curry, Coos)	-.286	-.358
Northeast (Umatilla, Wallowa, Grant, Baker, Wheeler, Union)	-.264	-.492
Southeast (Klamath, Lake, Harney, Malheur, Crook)	-.273	-.350

1. Districts located within the Willamette Valley and within Standard Metropolitan Statistical Areas. (The SMSA is an area established by the U. S. Bureau of the Census defining a metropolitan region.)

2. Districts located within the Willamette Valley but not within an SMSA.

3. Districts located outside the Willamette Valley and containing a town of 5,000 or more population.

4. Districts located outside the Willamette Valley but not containing a town of 5,000 or more population.

The figures below show the slopes of the survival curves for male and female teachers in these increasingly remote classes of school district.

Remoteness Index	Male	Female
1	-.185	-.322
2	-.241	-.362
3	-.237	-.347
4	-.323	-.384

Regular differences in survival expectancies appear for males but not for females. Among males they clearly are shortest in the most remote districts, longest in the metropolitan areas, and intermediate in the two classes of district with remoteness indexes of 2 and 3 (where, however, survival is identical). A similar pattern is faintly observable for females, but the outstanding fact is that the values do not differ appreciably among them. Remoteness makes little difference in the survival of females.

The strong effects for males and the virtual absence of effects for females seems to confirm further inference that occupational behavior is influenced by circumstances of work among males but not among female teachers. One important "circumstance" is the attractiveness of salary schedules--a matter to which male teachers should be particularly responsive. While no test can be made with present data, it is entirely possible that the "remoteness index" ranks school

districts by salary as well as by isolation and that it is the economic factor making the difference in male survival rates. This is one of the unanswered questions to which future research must be addressed.

School system size. As noted earlier, turnover studies regularly show a strong, inverse correlation between district size (measured by number of pupils or number of staff members) and teacher turnover ratios. Whitener, though, found little variation in survival curves associated with size; however, the schools he studied were too homogeneous to give a fair test. The turnover ratio, unlike the survival curve, uses staff size or something equivalent as its denominator, and under certain conditions a correlation between the ratio and size can be artifactually generated. Hence, it is useful to know if the relationship with size persists in the uncontaminated measure of staff stability.

The data in Table 3 demonstrate that school size, measured in this case by Average Daily Membership, is strongly and regularly related to survival expectancie among males only. In fact, district size is by far the most powerful influence on male survival rates of all the personal atrributes and district characteristics investigated. The median "life expectancy" of a male appointee in a district with 12,000 or more students is over three times longer than one in a district with fewer than 150 students.

School size, like remoteness, has no clearly discernible effect on the survival of female teachers.

Other district characteristics. No important differences in the slopes of curves were found between elementary districts, union or county high school districts, and unified districts for either male or female teachers, nor were they related in any way to district wealth, once the factor of size was controlled. (Wealth was measured as the true cash value of property in the district per weighted ADM).

Table 3. Survival Rates for Male and Female Oregon Teachers by Average Daily Membership of School System

System Size, in ADM	Slope of Survival Curve	
	Male	Female
1-49	*	*
50-149	-.531	-.451
150-299	-.356	-.279
300-599	-.318	-.328
600-1,199	-.256	-.351
1,200-2,999	-.202	-.334
3,000-5,999	-.210	-.330
6,000-11,999	-.154	-.403
12,000-24,999	-.154	-.348

*Too few teachers to calculate.

Implications

There are advantages as well as disadvantages, of course, in teacher turnover. For one thing, when salaries are as closely tied to length of service as they are in education, a district's instructional budget necessarily will be high if the teacher survival record is good. For another thing, administrators often prefer to rely on vigorous, young persons with fresh ideas for their teaching staffs even at the expense of having to replace them every year or two than on mediocre talent that will stay with the district indefinitely. The CASEA study does not touch on the important question of teacher competence.

At the same time, there are both hidden and direct costs associated with high turnover, and administrators may find themselves seeking ways to reduce it at least to an optimum level. If the findings of this study say anything to the personnel officer who wishes to improve the survival of his staff, they point to the wisdom of concentrating attention on teacher recruitment. He is best advised to recruit to his staff older females of the community who have completed their families. Recruitment from this group has been promoted in recent years on the grounds that it is a relatively untapped source of teacher supply, but this study demonstrates that there is an additional virtue: once recruited, these teachers are likely to stay.

A longer-range implication of the research is that it lays a foundation for the prediction of turnover in a school district. While a number of additional studies must be made first, in principle it is possible to construct actuarial tables showing the "life expectancies" of various age and sex categories of staff members for the state of Oregon. From information about the composition of the teaching staff, a district administrator could enter such tables and estimate the total number of teachers who would have to be replaced next year, the year after,

and so on. Further research, however, would have to determine whether a single set of tables would suffice for the entire state or whether they would have to be constructed separately for various classifications of districts. Indications are from the present study that separate tables are needed for districts of different sizes, at least for men teachers. More research would have to be done, too, on the extent to which survival rates have remained constant over the last ten or twenty years or, alternatively, have shown secular trends that would have to be accommodated by the tables.